What is claimed is:

1 A diamond semiconductor comprising a high-quality thin diamond film layer with few crystal defects and few impurities, implanted with ions of dopant elements and controllable in conductivity determined by a kind and a concentration of the dopant elements.

- 2. The diamond semicondustor according to claim 1, wherein said high-quality thin diamond film layer is capable of emitting ultraviolet light at room temperature by excitation using electron beam irradiation when it has a thickness of not less than 200 nm.
- 3. A method for the fabrication of a diamond semiconductor, comprising the step of implanting ions of dopant elements into a high-quality thin diamond film layer with few crystal defects and few impurities under conditions that can attain given distribution of concentrations of the dopant elements and with the high-quality thin diamond film layer kept to a temperature in accordance with the conditions so as not to be graphitized, to thereby enable the diamond semiconductor to have conductivity determined by a kind and a concentration of the dopant elements.
- 4. The method according to claim 3, wherein said high-quality thin diamond film layer is capable of emitting ultraviolet light at room temperature by excitation using electron beam irradiation when it has a thickness of not less than 200 nm.
- 5. The method according to claim 3, wherein said conditions are implantation energy in the range of 10 keV to 1000 keV and an ion implantation amount in the range of 1×10^{16} to 1×10^{21} /cm³.
- 6. The method according to claim 3, wherein said high-quality thin diamond film layer is kept at a temperature of room temperature to 800°C when implanted with the ions.